

OFFICE OF NUCLEAR REGULATORY RESEARCH

Fire Research: The Foundation of Fire Safety

Fire Testing

• NUREG/CR-7010, Phase 1, "Cable Heat Release, Ignition, and Spread in Tray Installations During Fire (CHRISTIFIRE) Phase 1: Horizontal Trays"

The National Institute of Standards and Technology (NIST) is conducting this work for the U.S. Nuclear Regulatory Commission's (NRC's) Office of Nuclear Regulatory Research (RES). Phase I of this project is complete and the report was issued in July 2012. Phase II testing is currently underway, which will continue to investigate electrical cable fire phenomena to better understand how to predict cable tray ignition, fire propagation (flame spread), and heat release rate.

• Organisation for Economic Co-operation and Development (OECD) Program on High Energy Arcing Faults (HEAF) Fire Experiments, Joint Analysis of Arc Faults (JOAN of ARC)

RES is working with the Office of International Programs and OECD to investigate the impacts of catastrophic electrical failure. The international experimental testing program consist of 12 countries which will assist in better understanding the phenomena and developing more realistic tools to model the risk.

Very Early Warning Fire Detection Systems (VEWFDS)

RES and NIST are conducting a testing program to evaluate the effectiveness of VEWFDS applications and system testing is currently in process.

Fire and Electrical Systems Circuit Analysis

• NUREG/CR-7100, "Direct Current Electrical Shorting in Response to Exposure Fire (DESIREE-Fire): Test Results" (Published April 2012)

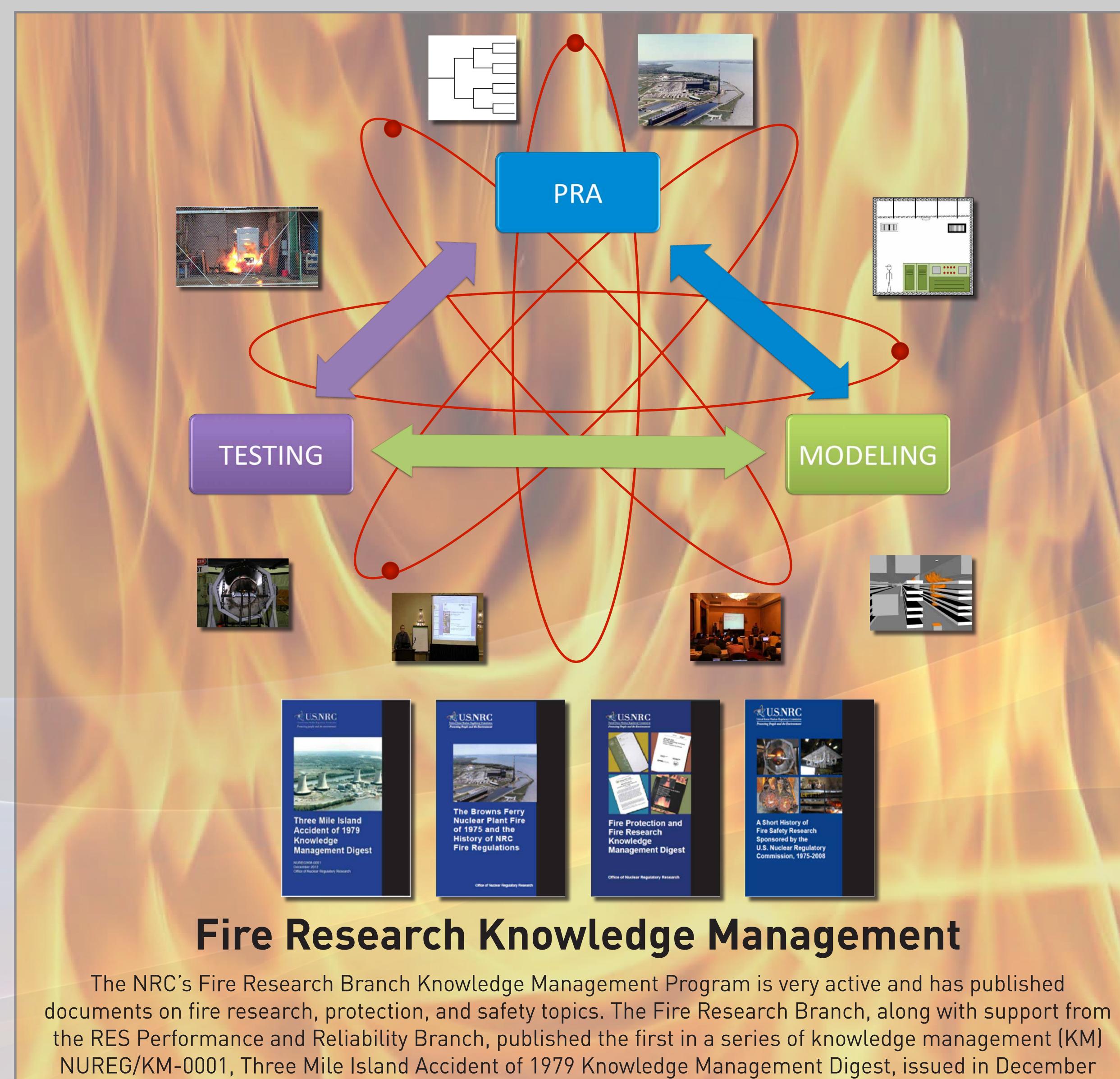
Sandia National Laboratories conducted the program testing and documented the results of the collected data on the failure modes of risk significant direct current powered control circuits.

• NUREG-2128, "Electrical Cable Test Results and Analysis during Fire Exposure (ELECTRA-FIRE)"

RES issued a draft report for public comment in June 2012 which analyzes, catalogues, and documents previous work performed to explore the electrical functionality of electrical cables exposed to fires.

• NUREG/CR-7150 (EPRI 1026424), "Joint Assessment of Cable Damage and Quantification of Effects from Fire (JACQUE-FIRE)"

RES in collaboration with the Electrical Power Research Institute (EPRI) and Brookhaven National Laboratory completed Volume 1, which documents the results of a phenomena identification and ranking table exercise to examine fire-induced electrical circuit failures that may occur in nuclear power plants (NPP). The team is currently working on Volume 2, which will document the probabilistic risk assessment (PRA) results.



2012. RES is currently working on Knowledge Management (KM) NUREG/KM-0002, The Browns Ferry Nuclear Plant Fire of 1975 Knowledge Management Digest.

Collaborative External Partners

In recent years, the Fire Research Branch has explored opportunities to collaborate with other agencies on several projects. Some of these partners include the following:















Fire Probabilistic Risk Assessment (PRA) and Human Reliability Analysis (HRA)

• NUREG-1921 (EPRI 1023001), "EPRI/NRC-RES Fire Human Reliability Analysis Guidelines"

This report, conducted as a joint project between RES and EPRI, was published in July 2012. It provides the methodology and explicit guidance for conducting a fire human reliability analysis (HRA).

Fire Events Database

RES coordinated with an EPRI-led project to update the industry fire events database. The updated information includes the most currently available fire event data and improves on previous data collection efforts.

Training

• NUREG/CP-0194, Volume 1-3 (EPRI 1020621), "Methods for Applying Risk Analysis to Fire Scenarios (MARIA-FIRES) - 2008"

The 2008 Fire PRA Workshop conference proceedings were adapted and published in 2010, as a fire PRA training tool by RES and EPRI. Since the publication of 2008 MARIA-FIRES, two new courses have been added to the Fire PRA Workshop: fire HRA and advanced fire modeling.

Fire PRA Workshop 2013

As a collaborative effort, RES and EPRI will provide a week-long free public training on fire PRA in 2013. The training will consist of five separate classes: Fire PRA, Circuit Analysis, Fire Analysis, Fire HRA and Advance Fire Modeling.

Fire Modeling

• NUREG-1934 (EPRI 1023259), "Nuclear Power Plant Fire Modeling Analysis Guidelines (NPP FIRE MAG)"

RES published this report in collaboration with EPRI in November 2012. It provides guidance to enhance the application of fire models used in NPPs. This report is the fifth in a series designed to assist those responsible for performing and reviewing fire models.

Other Research Activities

RES is involved in a number of additional research activities, including supporting the NRC Office of Nuclear Material Safety and Safeguards with development risk information in regulatory applications and testing of Storage Cask and Transportation Package O-Ring.

